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(54) **Signal structure for multicarrier modulation, which reduces the overhead requirement**

(57) A transmission system is disclosed which permits the receiving end to demodulate multi-valued modulated symbols successfully under fading conditions and reduces the amount of transmit reference data to improve data transmission efficiency. At the transmitting end, a multiplexing section (101), a modulating section (102), and a transmitting section (103) are provided. In transmitting an OFDM transmission frame, null symbols and reference symbols are placed in the beginning portion of the frame and QPSK symbols are placed in an information symbol data region in the frame with equal spacings in time and frequency. At the receiving end, a receiving section (111), a demodulation (112) section, an equalizing section (113), and a demultiplexing section (117) are provided. An error detector (114) detects amplitude and phase errors of each carrier from the reference symbols, and a variation detector (115) detects variations in amplitude and phase of a received signal from the QPSK symbols. The carrier amplitude and phase errors are corrected by a correction information producing section (116) on the amplitude and phase variations of the received signal detected by the variation detector to produce correction information. The equalizing section equalizes the demodulated symbol data according to the correction information.

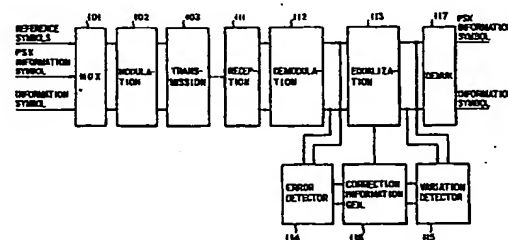


FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 96 10 4617

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A	WO 90 04893 A (THOMSON CSF) 3 May 1990 (1990-05-03) * page 21, line 5 - line 23 * * page 37, line 5 - line 18 * * page 38, line 23 - page 39, line 18 * * figure 11 * * figure 22 *	1,7,9	
A	BOSSERT M ET AL: "CHANNEL ESTIMATION AND EQUALIZATION IN ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING SYSTEMS" ITG-FACHBERICHTE, VDE VERLAG, vol. 135, 1995, pages 485-492, XP000749227 Berlin ISBN: 3-8007-2129-5 * page 489, line 2 - line 29 * * figure 1 *	9	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04L
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 3 April 2000	Examiner Farese, L
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P4/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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